

REMARKS

The Office Action has rejected claims 12, 17 and 18 under 35 U.S.C. §112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Further, the Office Action has rejected claims 1, 6, 12, 17 and 18 under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by U.S. Patent No. 5,800,952 to Urano, et al. ("Urano et al.") with U.S. Patent No. 6,033,829 to Yamada, et al. ("Yamada et al.") to show an allegedly inherent characteristic of 2-mercaptobenzothiazole.

The Applicant has amended the claims, which, when considered with the comments herein, are deemed to place the present application in condition for allowance favorable action, is respectfully requested.

At the outset, Applicant has amended claims 12 and 18 by reciting that the photoresist composition consists essentially of a polymeric binder, a photoactive component, an organic acid selected from a Markush group and optionally a cross-linking agent and by replacing "consisting essentially of" in line 2, with the term "comprising", as originally recited. In addition, claim 1 was amended to recite the photoresist composition also contains a polymeric binder, as originally recited in claim 1. It appears that in the last amendment, the term "polymeric binder" was inadvertently deleted.

No new matter is added to the application.

Pursuant to the rejection of claims 12, 17 and 18, under 35 U.S.C. §112, second paragraph, the Office Action questions whether the transitional phrase "consisting essentially of" in these claims refer to the photoresist composition. As amended, it is clear that the phrase

“consisting essentially of” does refer to the photoresist composition, consistent with the subject matter as recited in Claim 1. The Amendment obviates this rejection. Withdrawal thereof is respectfully requested.

Pursuant to the rejection of claims 1, 6-12, 17 and 18 under 35 U.S.C. §102(b), the Office Action cites Urano et al., and in addition, cites Yamada et al. to allegedly show an inherent fact.

The present invention is directed, to *inter alia*, a photoresist composition consisting essentially of a polymeric binder a photoactive component, an organic acid selected from the group consisting of a sulfonic acid, a phosphonic acid, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, glycolic acid, tartaric acid, malic acid, phthalic acid, benzene tricarboxylic acid, salicylic acid, cyclohexanecarboxylic acid, 1,4-cyclohexanedicarboxylic acid and sebacic acid and optionally a cross-linking agent, wherein the organic acid is non-polymerizable with the polymeric binder, optional cross-linking agent or both, and is present in an amount of from 0.5 to 5 parts per 40 parts of polymeric binder on a dry weight basis, and wherein the photoactive component is selected from the group consisting of 9-phenylacridine, n-phenylglycine, benzophenone, N,N'-tetramethyl-4,4'-diaminobenzophenone, N,N'-tetraethyl-4,4'-diaminobenzophenone, 4-methoxy-4'-dimethylaminobenzophenone, 3,3'-dimethyl-4-methoxybenzophenone, p,p'-bis(dimethylamino)benzophenone, p,p'-bis(diethylamino)-benzophenone, anthraquinone, 2-ethylanthraquinone, naphthaquinone, phenanthraquinone, benzoin, benzoinmethylether, benzoinethylether, benzoinisopropylether, benzoin-n-butylether, benzoin-phenylether, methylbenzoin, ethylbenzoin, dibenzyl, benzyldiphenyldisulfide, benzyldimethylketal, 1,7-bis(9-acridinyl)heptane, 2-chlorothioxanthone, 2-methylthioxanthone, 2,4-diethylthioxanthone, 2,4-

dimethylthioxanthone, 2-isopropylthioxanthone, 1,1-dichloroacetophenone, p-t-butyl-dichloroacetophenone, 2,2-diethoxyacetophenone, 2,2-dimethoxy-2-phenylacetophenone, 2,2-dichloro-4-phenoxyacetophenone, 2-(o-chlorophenyl)-4,5-diphenylimidazole dimer, 2-(o-chlorophenyl)-4,5-di(m-methoxyphenyl)imidazole dimer, 2-(o-fluorophenyl)-4,5-diphenylimidazole dimer, 2-(o-methoxyphenyl)-4,5-diphenylimidazole dimer, 2-(p-methoxyphenyl)-4,5-diphenylimidazole dimer, 2,4-di(p-methoxyphenyl)-5-phenylimidazole dimer, 2-(2,4-dimethoxyphenyl)-4,5-diphenylimidazole dimer and 2-(p-methylmercaptophenyl)-4,5-diphenylimidazole dimer. In another embodiment, the present invention is directed to a method of enhancing the removal of a photoresist composition from a substrate comprising the step of combining an organic acid selected from the group consisting of a sulfonic acid, a phosphonic acid, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, glycolic acid, tartaric acid, malic acid, phthalic acid, benzene tricarboxylic acid, 1,4-cyclohexanedicarboxylic acid and sebacic acid with a photoresist composition consisting essentially of a polymeric binder, a photoactive component, and optionally a cross-linking agent, wherein the organic acid is non-polymerizable with the polymeric binder, optional cross-linking agent or both, and is present in an amount of from 0.5 to 5 parts per 40 parts of polymeric binder on a dry weight basis, and wherein the photoactive component is selected from the group consisting of 9-phenylacridine, n-phenylglycine, benzophenone, N,N'-tetramethyl-4,4'-diaminobenzophenone, N,N'-tetraethyl-4,4'-diaminobenzophenone, 4-methoxy-4'-dimethylaminobenzophenone, 3,3'-dimethyl-4-methoxybenzophenone, p,p'-bis(dimethylamino)benzophenone, p,p'-bis(diethylamino)-benzophenone, anthraquinone, 2-ethylanthraquinone, naphthaquinone, phenanthraquinone, benzoin, benzoinmethylether, benzoinethylether, benzoinisopropylether, benzoin-n-butylether, benzoin-phenylether,

methylbenzoin, ethylbenzoin, dibenzyl, benzyldiphenyldisulfide, benzyldimethylketal, 1,7-bis(9-acridinyl)heptane, 2-chlorothioxanthone, 2-methylthioxanthone, 2,4-diethylthioxanthone, 2,4-dimethylthioxanthone, 2-isopropylthioxanthone, 1,1-dichloroacetophenone, p-t-butyl-dichloro-acetophenone, 2,2-diethoxyacetophenone, 2,2-dimethoxy-2-phenylacetophenone, 2,2-dichloro-4-phenoxyacetophenone, 2-(o-chlorophenyl)-4,5-diphenylimidazole dimer, 2-(o-chlorophenyl)-4,5-di(m-methoxyphenyl imidazole dimer, 2-(o-fluorophenyl)-4,5-diphenylimidazole dimer, 2-(o-methoxyphenyl)-4,5-diphenylimidazole dimer, 2-(p-methoxyphenyl)-4,5-diphenylimidazole dimer, 2,4-di(p-methoxyphenyl)-5-phenylimidazole dimer, 2-(2,4-dimethoxyphenyl)-4,5-diphenylimidazole dimer and 2-(p-methylmercaptophenyl)-4,5-diphenylimidazole dimer.

In an additional embodiment, the present invention is directed to a method of manufacturing a printed wiring board comprising the steps of a) disposing on a printed wiring board substrate a photoresist composition consisting essentially of a polymeric binder, a photoactive component, an organic acid selected from the group consisting of a sulfonic acid, a phosphonic acid, oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, glycolic acid, phthalic acid, benzene tricarboxylic acid, salicylic acid, cyclohexanecarboxylic acid, 1,4-cyclohexanedicarboxylic acid and sebacic acid and optionally a cross-linking agent, wherein the organic acid is non-polymerizable with the polymeric binder and optional cross-linking agent, and is present in an amount of from 0.5 to 5 parts per 40 parts polymeric binder on a dry weight basis, and wherein the photoactive component is selected from the group consisting of 9-phenylacridine, n-phenylglycine, benzophenone, N,N'-tetramethyl-4,4'-diaminobenzophenone, N,N'-tetraethyl-4,4'-diaminobenzophenone, 4-methoxy-4'-dimethylaminobenzophenone, 3,3'-dimethyl-4-methoxybenzophenone, p,p'-

bis(dimethylamino)benzophenone, p,p'-bis(diethylamino)-benzophenone, anthraquinone, 2-ethylanthraquinone, naphthaquinone, phenanthraquinone, benzoin, benzoinmethylether, benzoinethylether, benzoinisopropylether, benzoin-n-butylether, benzoin-phenylether, methylbenzoin, ethylbenzoin, dibenzyl, benzyldiphenyldisulfide, benzyldimethylketal, 1,7-bis(9-acridinyl)heptane, 2-chlorothioxanthone, 2-methylthioxanthone, 2,4-diethylthioxanthone, 2,4-dimethylthioxanthone, 2-isopropylthioxanthone, 1,1-dichloroacetophenone, p-t-butyl-dichloro-acetophenone, 2,2-diethoxyacetophenone, 2,2-dimethoxy-2-phenylacetophenone, 2,2-dichloro-4-phenoxyacetophenone, 2-(o-chlorophenyl)-4,5-diphenylimidazole dimer, 2-(o-chlorophenyl)-4,5-di(m-methoxyphenyl imidazole dimer, 2-(o-fluorophenyl)-4,5-diphenylimidazole dimer, 2-(o-methoxyphenyl)-4,5-diphenylimidazole dimer, 2-(p-methoxyphenyl)-4,5-diphenylimidazole dimer, 2,4-di(p-methoxyphenyl)-5-phenylimidazole dimer, 2-(2,4-dimethoxyphenyl)-4,5-diphenylimidazole dimer and 2-(p-methylmercaptophenyl)-4,5-diphenylimidazole dimer; b) imaging the photoresist; and c) developing the photoresist.

In all three embodiments, the photoresist composition consists essentially of a photoactive component, an organic acid selected from the specific organic acids listed in a Markush group and a photoactive component and optionally a cross-linking agent. Case law has held that the term “consisting essentially of” renders the claim open for the inclusion of only unspecified ingredients that do not “materially affect the basic and novel characteristics of the claimed composition.” PPG Industries v. Guardian Industries Corp., 156 F.3d 1351,1354, 48 USPQ2d 1351, 1353-1354 (Fed. Cir. 1998).

Urano et al. discloses a photopolymerizable composition for a color filter which comprises a photopolymerizable initiator system, a compound having at least one ethylenically

unsaturated double bond, a colorant and a phosphoric (meth)acrylic compound and/or an organic carboxylic anhydride having a molecular weight of at most 800.

The Office Action refers to Comparative Examples 6 and 9 of Urano et al. for allegedly disclosing applicants' claimed photoresist composition. Comparative Examples 6 and 9 of Urano et al. disclose a composition that includes a photopolymerization initiator system that includes the following three components: 4,4'-bis(dimethylamino)benzophenone (i.e., Michler's ketone), 2,2'-bis(o-chlorophenyl)-4,4',5,5'-tetraphenylbiimidazole and 2-mercaptobenzothiazole. These compositions also include an additive which is one of oxalic acid and phthalic acid.

It is the position of the Office Action that the 2-mercaptobenzothiazole of Urano's et al. composition does not materially affect the basic and novel characteristics of the claimed invention. The Office Action is citing Yamada et al., col. 10, lines 7-14 to support its allegation that 2-mercaptobenzothiazole is merely a compound that is added to a photopolymerizable composition to further increase performance of a photopolymerization initiation.

Applicant respectfully submits that the U.S.P.T.O. has improperly extrapolated the teachings of Yamada et al. to Urano et al. It is improper in this instance to generalize about the function of 2-mercaptobenzothiazole, without taking into account the other components presented and the reaction mixture. Although under one set of conditions, the 2-mercaptobenzothiazole, may not be essential, under another set of conditions, that same component may be an essential element affecting the basic and novel characteristics of the claimed composition. This is the situation in the instant case.

Yamada et al. discloses an ultraviolet and/or visible light curing a photopolymerizable composition comprising a visible light polymerization initiator comprising a quaternary boron salt and a sensitizing dye. The composition in Yamada et al. contains an ultraviolet or visible initiator. Yamada et al. disclose that an ultraviolet polymerization initiator (such as 2-mercaptobenzothiazole) can be added to the photopolymerizable composition to further “increase performance of the polymerization initiator”. The 2-mercaptobenzothiazole supplements the polymerization initiator that it is already present. Therefore, with respect to Yamada et al., the 2-mercaptobenzothiazole is not an essential element which affects the basic and novel characteristics of the claimed photopolymerizable composition.

However, in Urano et al., the situation is quite different. Urano et al. teach an ultraviolet curing photopolymerizable composition. The 2-mercaptobenzothiazole is the only initiator. There is no other component in the composition of Urano et al. to initiate free radical photopolymerization. Therefore, the addition of ultraviolet polymerization initiators is essential to the composition of Urano et al. Furthermore, in the working examples provided in the specification, Urano et al. also disclose that the utilization of 2-mercaptobenzothiazole can achieve the best efficacy. Therefore, in respect to Urano et al., 2-mercaptobenzothiazole is an essential element. Thus, if 2-mercaptobenzothiazole were present in the present composition, its presence would materially affect the basic and novel characteristics of the claimed composition. Accordingly, the 2-mercaptobenzothiazole is excluded from the present composition.

It is axiomatic that anticipation under § 102 requires that the prior art reference disclose each and every element of the claim to which it is applied. In re King, 801 F.2d, 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986). Thus, there must be no differences between the subject

matter of the claim and the disclosure of the prior art reference. Stated another way, the reference must contain within its four corners adequate direction to practice the invention as claimed. The corollary of the rule is equally applicable: Absence from the applied reference of any claimed element negates anticipation. Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986).

Thus, inasmuch as Urano et al. contains the 2-mecaptobenzothiazole and this component is excluded from the photoresist composition of the present invention, Urano et al. do not anticipate the present composition.

Therefore, this rejection under 35 U.S.C. §102(b) is obviated. Withdrawal thereof is respectfully requested.

Thus, in view of the Amendment in the claims and the Remarks herein, it is respectfully submitted that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,



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